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I. THE CLAIMS ARE NOT OBJECTIONABLE UNDER 35 U.S.C. §112, FIRST PARAGRAPH

The 35 U.S.C. §112, first paragraph, rejections are all based on the proposition that the term ASE is only used in the art to designate a type of scattered light emitted from gain media with discrete levels, and yet the disclosure does not mention any amplifier employing a gain medium with discrete levels. (Final Office Action at p. 4, lines 2-5).

a process where spontaneously emitted radiation (fluorescence) is amplified.  
(Encyclopedia of Laser Physics and Technology, RP Photonics Consulting GmbH,  
[http://www.rp-photonics.com/amplified\\_spontaneous\\_emission.html](http://www.rp-photonics.com/amplified_spontaneous_emission.html))

1 The application of the term ASE to a general amplification process in gain media, and not just  
2 gain media having discrete levels is also apparent in U.S. patent literature. For example, U.S.  
3 Patent No. 7,317,741 includes the following discussion of ASE.

4 In an optically active medium, or gain medium, the fluorescence or spontaneous  
5 radiative decay of an excited electron produces a photon, which can in turn trigger  
6 or stimulate other excited electrons to undergo radiative transitions. For a given  
7 volume of gain medium, spontaneous emission or fluorescence is randomly  
8 produced and distributed over  $4\pi$  steradians of solid angle, and can stimulate the  
9 emission of photons from other excited electrons in the gain medium, thereby  
10 amplifying the intensity of the spontaneously emitted photon. This phenomenon is  
11 sometimes referred to as amplified spontaneous emission (ASE). Because ASE is  
12 random and uniformly occurs over a solid angle of  $4\pi$  steradians, ASE can deplete  
13 or reduce the inverted population that is available for stimulated emission in a  
14 desired resonance cavity mode and lead to degradation in performance of an  
15 associated laser. (U.S. Patent No. 7,317,741 at col. 1, line 56 to col. 2, line 4)

16 Although certain embodiments of the present invention have been described, other  
17 versions are possible. **For example, while embodiments have been described as**  
18 **having certain gain media, the present invention is not limited to use with**  
19 **any particular gain medium. For example, ASE ducts may be used to**  
20 **mitigate the effects of ASE for any solid state gain media.** Example of such  
21 solid state gain media include, but are not limited to, crystal or sintered ceramic  
22 laser gain media materials, such as neodymium-doped yttrium aluminum garnet  
23 (Nd:YAG), with neodymium-doped gadolinium gallium garnet (Nd:GGG), or  
24 ytterbium-doped yttrium aluminum garnet (Yb:YAG). Moreover, while solid state  
25 gain media have been described, ASE ducts may be used to remove ASE from  
26 liquid gain media as well. For example, ASE ducts may be used to remove ASE  
27 from liquid dye gain media. (U.S. Patent No. 7,317,741 at col. 11, lines 4-19,  
28 Emphasis Added)

29 As another example, U.S. Patent No. 5,369,662 includes the following discussion regarding  
30 ASE.

31 Parasitic lasing is different from amplified spontaneous emission (ASE).  
32 Amplified spontaneous emission generally refers to amplified fluorescence inside  
33 of a laser rod or slab. The gain inside the laser medium becomes so high, that the  
34 amplified fluorescence decreases the upper laser level population via stimulated  
35 emission, thereby depleting the gain. (U.S. Patent No. 5,369,662 at col. 1, lines  
36 33-39)

1 It is apparent from the literature that "ASE" is not limited to describing certain types of light  
2 emitted from gain media with discrete levels.

3 The disclosure portion of the present application describes an optical amplifier unit 7 that  
4 is capable of coupling a sufficiently high optical pump power into a transmission line 9 to cause  
5 amplification within the transmission line (Clean Substitute Specification at p. 10, lines 6-9,  
6 Figure 1). Because it is known in the art that ASE refers simply to the situation in which  
7 spontaneously emitted radiation is amplified, and because the present application discloses an  
8 arrangement for producing gain in optical transmission line 9, the disclosure portion of the  
9 present application is enabling for a device which can produce ASE in an optical transmission  
10 line.

11 The Applicant also notes that although the publication cited in the Final Office Action,  
12 "Amplified Spontaneous Raman Scattering in Fiber Raman Amplifies" employs the term  
13 "amplified spontaneous Raman scattering," the publication does not indicate that the term ASE is  
14 applicable only to optical amplifiers using gain media with discrete levels. Rather the  
15 publication is silent as to the meaning of the term "ASE" in the art.

16 Because the claims use the term "ASE" consistently with both the disclosure portion of  
17 the present application and with an established meaning in the art, and because the disclosure  
18 portion of the application describes a structure in which ASE is produced, the Applicant  
19 respectfully submits that the rejections under 35 U.S.C. §112, first paragraph, are in error and  
20 should be withdrawn.

1 II. THE CLAIMS ARE NOT OBJECTIONABLE UNDER 35 U.S.C. §112, SECOND  
2 PARAGRAPH

3 The Final Office Action rejected claims 15-33 under 35 U.S.C. §112, second paragraph,  
4 as failing to set forth the subject matter which the Applicant regards as his invention. The  
5 Applicant respectfully traverses the rejections under 35 U.S.C. §112, second paragraph.

6 The Final Office Action cites a passage from the present application as sole support for  
7 the rejections under 35 U.S.C. §112, second paragraph. The Applicant would like to direct the  
8 Examiner's attention particularly to parts I and II of M.P.E.P Section 2172 and the cases cited  
9 therein. It is clear that the reliance on the Applicant's disclosure in forming the rejection under  
10 35 U.S.C. §112, second paragraph, is improper.

11 As discussed above, the term "ASE" refers to any spontaneous emission of radiation in a  
12 gain medium, that is, a spontaneous emission in a medium that is also subjected to amplification  
13 in the medium. The present claims require generating an optical pump signal at a pump power  
14 that is "sufficiently high to cause amplified spontaneous emission in the optical transmission  
15 line" (at element (a) of claim 15, for example). This limitation is clearly supported by the  
16 original disclosure, and merely represents a broad way to describe the process and structure set  
17 forth in the present disclosure.

18 For all of the above reasons the Applicant respectfully submits that the rejections under  
19 35 U.S.C. §112, second paragraph, are in error and should be withdrawn.

1        III.        THE CLAIMS ARE NOT OBVIOUS OVER KAMADA AND LARGE

2                The Final Office Action rejected claims 15-33 under 35 U.S.C. §103(a) as being  
3        unpatentable over U.S. Patent No. 7,031,049 to Kamada et al. (“Kamada” or the “Kamada  
4        patent”) in view of U.S. Patent No. 6,373,621 to Large et al. (“Large” or the “Large patent”).

5        The Applicant respectfully submits that the claims are not obvious in view of the proposed  
6        combination of Kamada and Large on the ground that there is no apparent reason in the prior art  
7        to combine Kamada and Large as proposed in the Final Office Action.

8                It is noted that the Final Office Action appears to reject claims 17 and 30 under Section  
9        103 in view of the proposed combination of Kamada and Large in spite of the later application of  
10       the additional reference to Aoki (discussed below) and the indication that the combination of  
11       Kamada and Large fails to include all of the limitations set out in claims 17 and 30. (Final Office  
12       Action at p. 8, lines 5-6). The Applicant believes that the Final Office Action did not intend to  
13       reject claims 17 and 30 in view of Kamada and Large, but only further in view of the Aoki  
14       reference.

15  
16       Claims 15-27

17                The Final Office Action cites Kamada as disclosing the bulk of the limitations set out in  
18       claim 15, but concedes that Kamada does not disclose that the controller modulates the pump  
19       power of the optical signal generated by the pump. The Final Office Action relies on the  
20       teaching of Large regarding the modulation of pump power in the operation of Raman amplifiers  
21       to support the modification of Kamada by modulating the excitation light power during start up.  
22       (Final Office Action, p. 6, lines 11-21).

1 Kamada discloses loss point detecting arrangements in distributed Raman amplifier  
2 systems. In particular, Kamada discloses four different embodiments of loss point detecting  
3 arrangements. A first embodiment is described in the reference from col. 5, line 5 to col. 7, line  
4 7, a second embodiment is described from col. 7, line 6 to col. 7, line 57, a third embodiment is  
5 described from col. 7, line 58 to col. 9, line 20, and a fourth embodiment is described from col. 9,  
6 line 21 to col. 10, line 5. The first and second embodiments employ a comparison of a ratio of  
7 reflected light power  $P_m$  to scattered light power  $A_{SS}$  to a predetermined value as the excitation  
8 light power is increased at a fixed rate to a determination value  $P_{jdg}$  that is still below a  
9 transmission path burn out power level. (Kamada at col. 5, line 41 to col. 7, line 5, particularly  
10 col. 6, lines 16-25 as to the first embodiment; col. 7, lines 50-57 as to the second embodiment).  
11 The third and fourth embodiments more simply compare a scattered light power  $A_{SS}$  to a  
12 reference power level  $A_{th}$  as the excitation power is raised at a fixed rate to the determination  
13 value  $P_{jdg}$ . (Kamada at col. 8, lines 9-23 as to the third embodiment; col. 9, lines 57-63 as to the  
14 fourth embodiment). It is apparent from this disclosure in Kamada that the loss point detection  
15 relies on (1) a comparison between a measured ratio of reflected light power  $P_m$  to scattered light  
16 power  $A_{SS}$  and an expected/predetermined value of the ratio, or (2) a comparison of a measured  
17 scattered light power  $A_{SS}$  to an expected/predetermined value of that power, both at a given  
18 excitation light power level. No modulation of any of the signals is suggested in Kamada.

19 Large discloses an arrangement for detecting breaks in communication fibers in a  
20 communication system employing Raman amplification. (Large at col. 1, lines 17-67). The  
21 arrangement relies on a first Raman pump laser pumping an optical fiber in a first direction from  
22 a first end toward a second end, and a second Raman pump laser pumping the optical fiber in a

1 second opposite direction. (Large at col. 2, lines 22-27) The signal of one or both of the lasers is  
2 modulated and the detection of the modulated signal at the opposite end of optical fiber indicates  
3 that the fiber is continuous. (Large at col. 2, lines 48-52; col. 3, lines 32-37).

4 The detection technique in Large is intended to overcome the problems of relying solely  
5 on a back reflection to detect a fiber break or relying on a loss of signal power at the amplified  
6 wavelengths. (Large at col. 1, line 43 to col. 2, line 5). However, neither of these problems are  
7 present in the Kamada loss point detection system because that system relies on characteristic  
8 reflected light power to scattered light power ratios or characteristic scattered light power in  
9 order to detect loss points.

10 The Final Office Action supports the combination of the pump power modulation  
11 technique of Large with the apparatus of Kamada with the proposition that adding the  
12 modulation to the Kamada system would provide unique identification signals. (Final Office  
13 Action at p. 6, lines 17-20). However, Kamada already includes a loss point detection technique  
14 based on unique identification of signals ( $P_m/ASS$  or  $ASS$ ) at a determination excitation light  
15 power level  $P_{jdg}$ . (Kamada at col. 6, lines 4-25 and col. 8, lines 1-23). There is no suggestion  
16 in the prior art that modulating the excitation power in Kamada as proposed in the Final Office  
17 Action would in any way improve the loss point detection technique employed in Kamada. In  
18 this light, there is no reason apparent in the prior art that would prompt one of ordinary skill in  
19 the art to employ pump power modulation as taught by Large in the loss point detection start up  
20 technique disclosed Kamada. The modulation in Large neither addresses a problem identified for  
21 the Kamada technique nor would it improve detection with the Kamada technique. In fact, it  
22 appears that modulating the excitation light power in Kamada would interfere with the Kamada

1 detection technique because each embodiment in Kamada requires raising the excitation light  
2 power at a fixed rate from zero while monitoring the scattered light power or both scattered light  
3 power and reflected light power. (See Kamada at col. 5, lines 42-48 and col. 8, lines 9-23). Thus  
4 the teachings in Kamada would have in fact dissuaded one skilled in the art from applying the  
5 pump power modulation taught by Large during start up of the loss point detection system in  
6 Kamada.

7 It is further noted that the technique disclosed in Large for detecting a fiber break operates  
8 to shut down a first Raman pump in response to the loss of modulated signal from a distant  
9 Raman pump. Thus the technique in Large is conceptually different from the scattered or  
10 scattered and reflected light monitoring technique disclosed in Kamada. This basic conceptual  
11 difference indicates that there would have been no reason for one skilled in the art to have  
12 employed the Raman pump modulation technique in Large during start up of the loss point  
13 detection system in Kamada.

14 It is also noted that the purpose of modulating the pump power during start up according  
15 to the present invention is to facilitate accurate detection of even a very low power ASE signal,  
16 such as that to be expected during start up of an optical transmission system. (See Clean  
17 Substitute Specification at p. 13, line 17 to p. 14, line 2). Neither Kamada nor Large teaches or  
18 suggests this advantage of modulating the pump power during start up.

19 Because there is no reason apparent in the prior art that would have led one of ordinary  
20 skill in the art to apply the pump modulation of Large to the excitation light applied in Kamada  
21 during start up, the Applicant respectfully submits that claim 15 is not obvious over the proposed



1 combinations of Kamada and Large, and that claim 15 is therefore in condition for allowance  
2 together with its dependent claims, claims 16-27.

3 Claims 28-33

4 The Applicant first notes the indication in the Final Office Action that certain portions of  
5 the claims are deemed statements of intended use and do not serve to patentably distinguish over  
6 the prior art. (Final Office Action at p. 6, lines 3-7). The Applicant respectfully submits that the  
7 failure to consider all of the claim terms when interpreting the claims is a fundamental error. It is  
8 well established that each term in a claim has meaning and each term must be considered when  
9 judging the patentability of the claim against the prior art. *In re Wilson*, 424 F.2d 1382, 1385,  
10 165 U.S.P.Q. 494, 496 (CCPA 1970). The Final Office Action cites M.P.E.P §2114 to support  
11 the failure to consider certain functional phrases appearing in claims 28-33. However, nothing in  
12 this section of the M.P.E.P provides an exception to the general rule that all claim terms must be  
13 considered in determining patentability. Cases cited under M.P.E.P. §2114 relate to  
14 incorporating unclaimed functions into the claims (e.g. *Hewlett-Packard Co. v. Bausch & Lomb*  
15 *Inc.*, 909 F.2d 1464, 1469, 15 U.S.P.Q.2d 1525, 1528 (Fed. Cir. 1990)) or language regarding a  
16 position of a structural element relative to a material that the apparatus works upon (e.g. *Ex parte*  
17 *Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)). It is noted that in *Ex parte Masham*  
18 the holding was that “a recitation with respect to the material intended to be worked upon by a  
19 claimed apparatus does not impose any structural limitations upon the claimed apparatus which  
20 differentiates it from a prior art apparatus satisfying the *structural* limitations of that claimed.”  
21 *Ex Parte Masham* at 1648. The Board did not hold in that case that functional limitations cannot

1 distinguish over prior art, but merely held that the particular limitation regarding the material  
2 worked upon did not distinguish over the prior art.

3 Independent claim 28 requires a “control unit” connected in a certain fashion and  
4 performing certain functions including “modulating the pump power of the optical signal  
5 generated by the pump source during a period in which the optical amplifier is started up.” This  
6 limitation corresponds to the limitation in claim 15 discussed above. Thus all of the arguments  
7 presented above with respect to claim 15 apply with equal force to claim 28. The Applicant  
8 therefore respectfully submits that claim 28 is not obvious over the proposed combination of  
9 Kamada and Large and is entitled to allowance together with its respective dependent claims,  
10 claims 29-33.

11  
12 IV. CLAIMS 17 AND 30 ARE NOT OBVIOUS OVER KAMADA, LARGE, AND AOKI

13 The Final Office Action also rejected claims 17 and 30 under 35 U.S.C. §103(a) as being  
14 unpatentable over Kamada and Large, and further in view of U.S. Patent No. 6,879,434 to Aoki  
15 et al. (“Aoki” or the “Aoki patent”). Specifically, the Final Office Action cited Aoki for its  
16 disclosure of an optical network in which error information from various optical nodes is  
17 collected to produce error messages. Nothing in Aoki makes up for the deficiencies of Kamada  
18 and Large as to independent claims 15 and 28. Thus, claims 17 and 30 are allowable at least as  
19 being dependent upon an allowable base claim.

1 V. CONCLUSION

2 For all of the above reasons the Applicant respectfully requests reconsideration and  
3 allowance of claims 15-33.

4 If the Examiner should feel that any issue remains as to the allowability of these claims,  
5 or that a conference might expedite allowance of the claims, the Examiner is asked to telephone  
6 the undersigned attorney at the number listed below.

7  
8 Respectfully submitted,

9 THE CULBERTSON GROUP, P.C.

10  
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